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IS 9471-4 (1980): Modular Lower Limb Orthotic Components, Part IV: Joint Unit, Ankle [MHD 10: Medical Laboratory Instruments]

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Indian Standard (Reaffirmed 1997)

SPECIFICATION FOR MODULAR LOWER LIMB ORTHOTIC COMPONENTS

PART IV JOINT UNIT, ANKLE

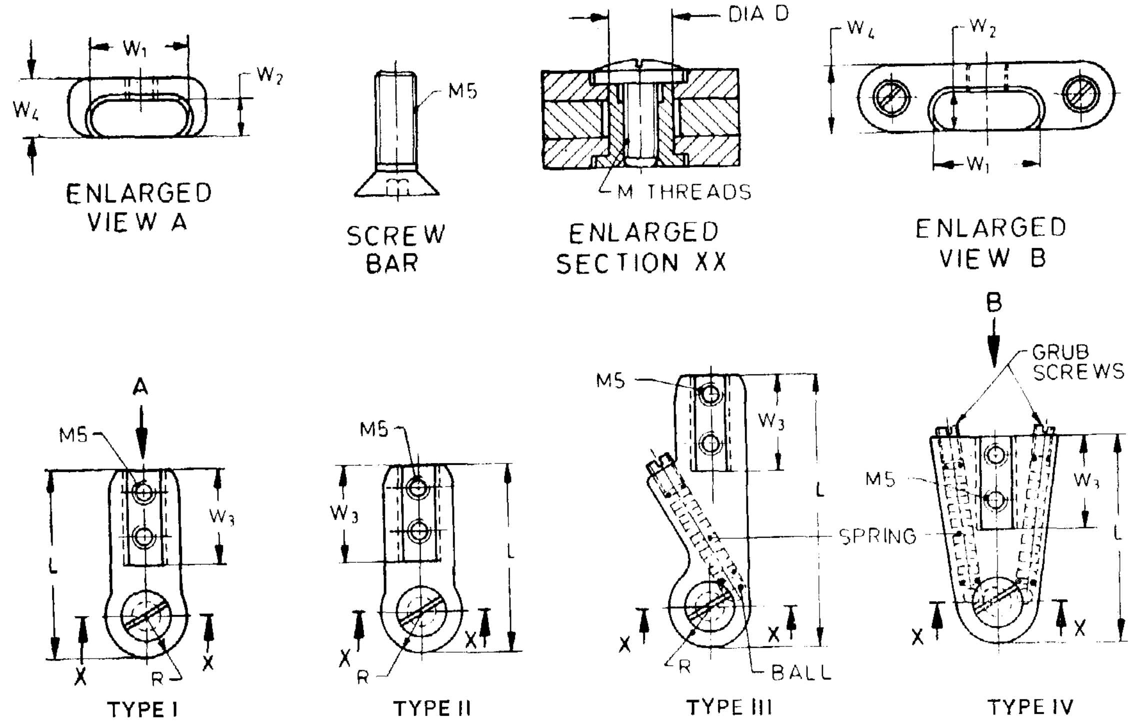
1. Scope — Covers requirement of joint unit ankle for modular lower limb braces.

2. Type — Four types of joint unit ankle shall be as given below:

Type I — Free motion
Type II — Limited motion
Type III — Foot drop
Type IV — Double action

3. Shape and Dimensions

3.1 The typical shape of joints is shown in Fig. 1. The joint unit ankle of all types shall be in three sizes to suit the corresponding size of stirrups/stirrups split.



Dimensions	Size 1 Type I & II	Size 1 Type III	Size 1 Type IV	Size 2 Type I & II	Size 2 Type III	Size 2 Type IV	Size 3 Type I & II	Size 3 Type III	Size 3 Type IV
L (± 0·5)	47	70	51	52	80	57	57	90	63
R (± 0·25)	10·0			12·0			15·0		
Dia, *D* (*H* 8)	7			9			9		
M Thread	*M*5			*M*6			*M*6		
*W*1 ± 0·25	12·0			16·0			20·0		
*W*2 ± 0·25	5·0			6·0			6·0		
*W*3 ± 0·25	25			25			25		
*W*4 ± 0·25	8·0			9·0			9·0		
Compressibility of spring, *Min*	8			11			11		

All dimensions in millimetres.

FIG. 1 JOINT UNIT, ANKLE

Artificial Limbs Sectional Committee, CPDC 20; Prosthetic and Orthotic Appliances Subcommittee, CPDC 20 : 1 [Ref : Doc : CPDC 20 (1436)]

Adopted 27 October 1980 | © February 1981, ISI | Pric[redacted] Gr 2

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NEW DELHI 110002

3.2 *Overall Dimensions* — The overall dimensions of the joint unit shall be as given in Fig. 1.

3.3 In the case of free motion, limited motion and foot drop ankle joint unit, the inside (medical) joints shall be contoured to 15 ± 1°, as shown in Fig. 2 and the outside (lateral) joints shall be straight.

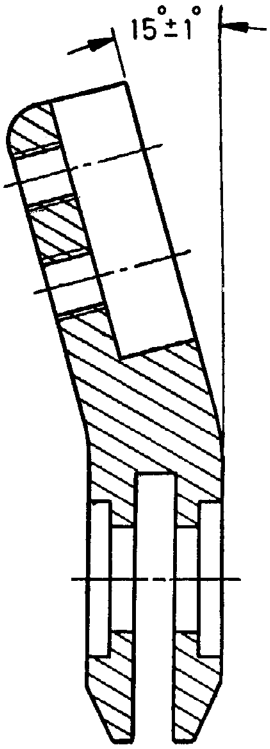

FIG. 2 INSIDE JOINT, FOR KNEE JOINT UNIT

3.4 *Depth of Slot* — Depth of slot shall be arrived at by the manufacturers depending on their individual designs to match with their stirrups and shall be subject to the following performance considerations.

3.4.1 *Free motion* (*Type 1*) — The joint shall provide an unrestricted movement of at least 45° in both planter flexion and dorsi flexion when assembled with stirrups free motion.

3.4.2 *Limited motion* (*Type 2*) — The joint shall provide no movement when fitted with limited motion stirrup. In case movement is required in planter or/and dorsi flexion, shaping of stirrups should be done at the time of fittings.

3.4.3 *Foot drop* (*Type 3*) — The joint shall provide the maximum dorsi flexion of 15° when assembled with, stirrup-foot drop.

3.4.4 *Double action* (*Type 4*) — The joint shall provide equal planter flexion and dorsi flexion of 25° to 30° when assembled with stirrups double action.

3.5 Screw shall conform to designation M5 × 10 of IS : 6761-1972 ' Specification for countersunk head screws with hexagon socket '.

4. Material

4.1 The male and female parts of the joint unit shall be manufactured from high strength heat-treatable stainless steel conforming to designation 30Cr13 or 12Cr13 of IS : 1570-1961 ' Schedule for wrought steels for general engineering purposes '.

4.2 The screws shall be manufactured from cold rolled bright steel annealed bars conforming to IS : 4855-1968 ' Specification for bright steel bars for machining '.

4.3 The nut shall be made from carbon steel conforming to designation 25C12 S14 or 40C15 S12 or 40C10 S18 of IS : 4431-1978 ' Specification for carbon and carbon-manganese free-cutting steels '.

4.4 The steel ball shall conform to IS : 2898-1976 ' Specification for steel balls for rolling bearings (*first revision*) '.

4.5 The spring shall be made from spring steel wire conforming to IS : 4454 (Part I)-1975 ' Specification for patented and cold drawn steel wires — unalloyed (*first revision*) ' or IS : 4454 (Part IV)-1974 ' Specification for stainless spring steel wire for normal corrosion resistance (*first revision*) ', for a spring rate of 13 ± 2 N/mm.

5. Workmanship and Finish

5.1 The joints shall be accurately machined and the joint faces shall be finished clean and free from tool marks. Fabrication by welding or brazing shall not be allowed. The outside surfaces of the joint shall be free from casting defects. All sharp edges and corners shall be rounded. The component shall be free from surface flaws and cracks. The joint shall be electro-polished after hardening and sand blasting.

5.2 The spring shall be capable of 1 million cycles of operation and shall be supplied in blackened/ phosphated finish.

5.3 The joint nut, screw and grub screws shall be supplied in dull nickel plated finish conforming to Grade 1 of IS : 1068-1968 ' Specification for electroplated coatings of nickel and chromium on iron and steel (*first revision*) '.

5.4 The screw bar shall be supplied in blackened/phosphated finish.

6. Heat Treatment — The male and female parts of the joint unit and the nut shall be hardened and tempered to 240 to 300 *HV*.

7. Marking — Shall be marked with the manufacturer's name, initials or recognized trade-mark and with proper identification of the type, size and material.

7.1 *ISI Certification Marking* — Details available with the Indian Standards Institution.

8. Packing — The joints shall be packed in polyethylene bags and the ends shall be heat-sealed. They may also be packed as agreed to between the manufacturer and the purchaser.

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TO
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PART 4 JOINT UNIT ANKLE

(*Page* 1, *table under Fig*. 1, *Type* II, *Limited Motion*) — Substitute the following dimensions for existing:

Dimension	**Size 1**	**Size 2**	**Size 3**
L (± 0.5)	42.5	48.5	52

(*Page* 2, *clause* **3.5**) — Add the following new clause after **3.5**:

'**3.6** A rivet of minimum 4 mm diameter shall be used.'

(*Page* 2, *clause* **4.1**) — Substitute the following for the existing clause:

"The male and female parts of the Joint unit shall be manufactured from high strength heat treatable stainless steel conforming to Designation 30Cr13 or 04Cr17Ni12Mo2 of IS 6911 : 1992 'Stainless steel plate, sheet and strip'."

(*Page* 2, *clause* **4.2**) — Substitute the following for the existing clause:

"The screws shall be manufactured from cold rolled bright steel annealed bars conforming to IS 9550 : 2001 'Bright steel bars — Specification'."

(*Page* 2, *clause* **4.3**) — Substitute the following for the existing clause:

"The nut shall be made from cold rolled bright steel annealed bars conforming to IS 9550 : 2001 'Bright steel bars – Specification'."

(*Page* 3, *clause* **4.5**) — Add new clause after **4.5**:

'**4.6** The rivet shall be manufactured from a suitable aluminium alloy.'

(MHD 09)

Reprography Unit, BIS, New Delhi, India